

H. S. John.

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## A STUDY OF THE GENUS ZIZANIA.

NORMAN C. FASSETT.

IN attempting to place some unusual specimens of *Zizania* collected in the summer of 1923 near the city of Quebec, the writer found it difficult to determine to his satisfaction the precise difference between *Z. palustris* and *Z. aquatica* as defined by Professor A. S. Hitchcock in the seventh edition of Gray's Manual. Examination of the spikelets, however, showed that there was a distinct difference, apparently recently overlooked, in the texture of the pistillate lemmas; those of the northern narrow-leaved form (*Z. aquatica* of the Manual) are firm and tough, while those of the southern broad-leaved form (*Z. palustris* of the Manual) are thin and papery. This character, combined with the greater height, wider leaves, and more luxuriant inflorescence of the southern form, would appear sufficient for specific distinction, were it not for the fact that in the Middle West there is a grass which combines the characters of these two, having the large vegetative growth of the southern plant, and the firm lemma of the northern one.

The *Zizania palustris* of Hitchcock's treatments was known as *Z. aquatica* until 1908, when he applied the latter name to the small plant of the North. Linnaeus had based *Z. aquatica* upon Gronovius's *Zizania* of the Flora Virginica, page 189, and upon *Arundo alta gracilis, foliis viridi caeruleis, locustis minoribus*, Sloan. Hist. Jamaica, page 110, plate 67. The plant of Gronovius' was undoubtedly the broad-leaved one, as the narrow-leaved plant is not found south of New

England; no *Zizania* occurs in Jamaica, and Sloane's plant is probably *Phragmites communis* (L.) Trin. *Z. aquatica* of the Species Plantarum should be taken, then, as based upon *Zizania* of Gronovius, and the name of the genus itself was taken, of course, directly from Gronovius.

Professor Hitchcock states<sup>1</sup> that the two specimens of *Zizania* in the Linnean herbarium are the narrow-leaved form, one of which is marked "1 aquatica," and the other "Zizania HU," each in Linnaeus's hand. Here arises a difficult nomenclatorial question. Linnaeus's reference in the Species Plantarum (i. e., Gronovius) obviously belongs to one plant, and his specimen ("1 aquatica") to another.<sup>2</sup> Hitchcock solved this problem by applying the later-defined name, *Z. palustris* L.,<sup>3</sup> to the broad-leaved plant, thus reserving *Z. aquatica* for the narrow-leaved one which was represented by a specimen in the Linnean herbarium, saying, "The fact that later he [Linnaeus] described the broad-leaved form as a distinct species confirms the opinion that his idea of *Z. aquatica* was the narrow-leaved species." But was *Z. palustris* the broad-leaved species, as Hitchcock stated? The description of this species starts, "Culmis bipedalis;" the broad-leaved species to which Hitchcock referred this name is commonly from two to three meters high, while the narrow-leaved plant seldom exceeds a meter in height. "*Gluma calycina diphylla rigidula*" applies to the firm lemmas of the narrow-leaved plant much better than to the papery lemmas of the broad-leaved one. "Folia . . . *arundinia phragmitis latiora*," upon which Hitchcock based his decision, loses some of its force when we note that the leaves of the European *Phragmites communis*, which Linnaeus doubtless had in mind, are in general narrower than those of the plant with which we are familiar in America.

*Zizania palustris* was definitely described from the Hortus Upsaliensis ("H. U."), and there is a sheet marked "HU" in the Linnean herbarium, which is, according to Hitchcock, the narrow-leaved plant, and it is fairly evident that it was from material of which this sheet is representative that Linnaeus made the description of that species. Schreber, one year after the description of *Z. palustris*, gave a full discussion of this plant, which he states had only recently

<sup>1</sup> Contrib. U. S. Nat. Herb. xii. Pt. 3: 124 (1908).

<sup>2</sup> It is interesting in this connection to note Mr. F. V. Coville's preface to Professor Hitchcock's work, in which he states as a principle that in such cases the Linnean reference rather than the specimen marked by Linnaeus should determine the application of a name.

<sup>3</sup> Mant. 295 (1771).

been grown in the Upsala gardens,<sup>1</sup> and his colored plate represents the small plant, not only in size of plant and width of leaf, but in the character of the pistillate lemma, which is plainly shown. Col. Monro, in his identification of the grasses in the Linnean herbarium,<sup>2</sup> says, "I. *Z. aquatica*, L.! The plant so named is the small state which I believe Linnaeus, in his Mant. p. 295, intended to indicate by *palustris*, of which form there is also a specimen from Upsal Garden, marked 'palustris' by Sm." There can be no doubt, then, that *Z. palustris* is the small narrow-leaved plant.

The sheet marked "1 *aquatica*" was in the Linnean herbarium in 1753,<sup>3</sup> but Linnaeus drew no description from this specimen, nor did he quote any locality in addition to those given by Gronovius and Sloane. He identified the specimen in his herbarium with the Gronovian plant, apparently after the publication of *Z. aquatica*. Later he segregated the narrow-leaved plant as *Z. palustris*, leaving the name *Z. aquatica* for the tall broad-leaved plant of the more southern range, which was its original application.

*ZIZANIA* L. Gen. Pl. ed. 5: 427 (1754). Monoecious grasses, the upper part of the inflorescence pistillate, the lower staminate: glumes obsolete, represented in the pistillate spikelets by minute cupules below the lemmas: pistillate lemma usually long-awned, closely embracing the grain, clasping the palea by its inrolled margins, scabrous at least on the nerves and awn; staminate lemma and palea sub-equal, lemma sometimes short-awned: grain long-cylindrical, black: stamens six. Type species *Z. aquatica*.

- a. Plants without creeping rootstocks: staminate branches of the inflorescence invariably lacking pistillate flowers; pedicels of the pistillate spikelets coarse and clavate, those of the staminate capillary *b*.
- b. Pistillate lemmas thin and papery, dull, finely striate, scabrous over the whole surface;<sup>4</sup> the aborted spikelets slender and shriveled, less than 1 mm. thick *c*.
- c. Plant (0.8-) 1.2-3 m. tall: leaves (0.8-) 1-5 cm. broad; ligules (0.6-) 1-2 (-2.5) cm. long: awn of the pistillate lemma (1.5-) 2-7 cm. long ..... *Z. aquatica*.

<sup>1</sup> Schreber, Beschreibung der Gräser, ii. 55 (1772). "In Betrachtung dessen würde es vielleicht nützlich sein, dieses Gewächs, welches in dem königlichen französischen Garten zu Trianan schon seit geraumer Zeit cultivirt wird, in dem akademischen botanischen Garten zu Upsal neuerlich fortgekommen ist, und auch in den meisten Gegenden von Deutschland ohnfehlbar fortkommen würde, einheimisch zu machen."

<sup>2</sup> Monro, Journ. Linn. Soc. vi. 51 (1862).

<sup>3</sup> Jackson, B. D. Proc. Linn. Soc. London, 124th session, 152 (1912).

<sup>4</sup> This character is best seen with the binocular microscope.

- c. Plant 4-5.5 dm. tall; leaves 3-12 mm. broad; ligules 3 mm. long: awn of the pistillate lemma 1-8 mm. long. .... var. *brevis*.
- b. Pistillate lemmas firm and tough, with lustrous coarsely corrugate surface, scabrous on the margins, at the summit and along the awn, and sometimes along the nerves, otherwise glabrous: the aborted spikelets with distinct body 1.5-2 mm. thick d.
- d. Plant 0.7-1.5 m. tall: leaves 4-10 (-14) mm. broad; ligules 3-5 (-10) mm. long: lower pistillate branches with 2-6 spikelets; lower or middle staminate branches with 5-15 spikelets. .... var. *angustifolia*.
- d. Plant 0.9-3 m. tall: leaves 1-3 cm. broad; ligules 1-1.5 cm. long: lower pistillate branches with 11-29 spikelets; lower or middle staminate branches with (20-) 30-60 spikelets. .... var. *interior*.
- a. Plant perennial, with creeping rootstocks: uppermost staminate branches of the inflorescence terminated by pistillate spikelets: pedicels of the staminate and the pistillate spikelets of nearly the same diameter. .... *Z. latifolia*.

1. *ZIZANIA AQUATICA* L. Sp. Pl. ii. 991 (1753); Lamb. Linn. Trans. vii. 264, t. 13 (1804);<sup>1</sup> Nutt. Gen. N. Am. Pl. ii. 210 (1818); Elliott, Sketch of Bot. of S. C. & Ga. ii. 585 (1824); Chapman, Fl. Southern U. S. 549 (1860); Bentham, Journ. Linn. Soc. xix. 54 (1881) in part; Rendle, Journ. Linn. Soc. xxxvi. 345 (1904) in part; not Willd. Sp. Pl. iv. 394 (1805); nor Link, En. Pl. ii. 391 (1822); nor Hitchcock, Contrib. U. S. Nat. Herb. xii. Pt. 3: 124 (1908) and in Gray, Manual, ed. 7: 120 (1908). *Z. clavulosa* Michx. Fl. Bor.-Am. i. 75 (1803); Willd. Sp. Pl. iv. 394 (1805). *Hydropyrum esculentum* Link, Hort. Berol. i. 252 (1827) in part; Kunth, Enum. i. 9 (1833) in part, and Suppl. 7, t. 1, fig. 1 (1835). *Z. effusa* Herb. L. ex Monro, Journ. Linn. Soc. vi. 52 (1862). *Z. palustris* Hitchcock, Contrib. U. S. Nat. Herb. xii. Pt. 3: 124 (1908) and in Gray, Manual, ed. 7: 120 (1908); not L. Mant. 295 (1771).—Mouths of rivers and in brackish places, along the Atlantic coast of North America from southern Maine to western Florida and probably Louisiana, inland in northern New York, and rarely in Michigan.

The following representative specimens may be cited:<sup>2</sup> MAINE: Woolwich, Sept. 15, 1916, *Fernald & Long*, no. 12581; Bowdoinham, Sept. 14 and 19, 1916, *Fernald & Long*, no. 12580. MASSACHUSETTS: Newbury, July 21, 1913, *D. White*, no. 214; Harwich, Aug. 7, 1919, *Fernald & Long*, no. 17904. NEW YORK: Woodville, June 23, 1921, *H. D. House*, no. 8217; Hammond, July 28, 1915, *O. P. Phelps*, no. 1371; Ithaca, Aug. 12, 1916, *F. P. Metcalf*, no. 5581; Glenmont, Sept. 12, 1917, *H. D. House*; Sandy Creek Township, Aug. 25, 1922, *Fernald, Wiegand, & Eames*, no. 14161. NEW JERSEY: Point Pleasant,

<sup>1</sup> The plate illustrates the broad-leaved plant. Lambert states on the authority of Smith that Linnaeus described it originally as *Z. aquatica*, but later called it *Z. palustris*, reserving the former name for Sloane's plant (which is *Phragmites communis*).

<sup>2</sup> Specimens in the Gray Herbarium and Herbarium of the New England Botanical Club unless otherwise noted.

Sept. 8, 1917, *A. Gershoy*, no. 78. DISTRICT OF COLUMBIA: Washington, Aug. 14, 1905, *Agnes Chase*, Kneucker's Gramineae Exsiccatae, no. 560; Eastern Branch, July, 1900, *E. D. Merrill*, no. 171. VIRGINIA: Carter's Wharf, Aug. 27, 1915, *I. Tidestrom*, no. 7729; Port Royal, Aug. 26, 1915, *I. Tidestrom*. FLORIDA: Duval Co., *A. H. Curtiss*, no. 3364 (there are two sheets under this number in the Gray Herbarium: one is typical *Z. aquatica*; the other has the pistillate lemmas partially glabrous, but still of sufficiently thin texture to warrant referring it here). ONTARIO: Pelee Island, Aug. 21, 1915, *MacDaniels & Eames*. MICHIGAN: New Buffalo, July 20, 1911, *O. E. Lansing, Jr.*, no. 3279.

1a. *Z. AQUATICA*, var. **brevis**, n. var., culmis 2-6.5 dm. altis solitariis vel subcaespitosis; foliis substrictis 6-18 cm. longis 3-9 (-11) mm. latis, ligulis 3 mm. longis; lemmatibus feminineis 5-8 mm. longis chartaceis scabratris, aristis 1-8 mm. longis.

Culms 2-6.5 dm. tall, solitary or subcaespitose: leaves ascending, 6-18 cm. long, 3-9 (-11) mm. broad; ligules 3 mm. long: pistillate lemmas 5-8 mm. long, of thin papery texture, scabrous over the whole surface; awns 1-8 mm. long.—Tidal flats of the St. Lawrence River about Quebec. PROVINCE OF QUEBEC: St. Lawrence River above the city of Quebec, Sept., 1912, *M. O. Malte*; rocky tidal flats, Levis, Aug. 9, 1923, *Svenson & Fassett*, no. 853 (TYPE in Gray Herb.); rocky tidal flats, St. Augustin, Aug. 7, 1923, *Svenson & Fassett*, no. 854; Ste. Anne de Beaupré, Aug. 30, 1905, *John Macoun*, no. 68989; grèves intercotidales de Beauport, Aug. 8, 1922, *Bro. Victorin*, no. 15230. ONTARIO: Casselmann, *John Macoun*, no. 85842, approaches this variety, but has awns 1-1.5 cm. in length.

1b. *Z. AQUATICA*, var. **ANGUSTIFOLIA** Hitchcock, RHODORA, viii. 210 (1906). *Z. palustris* L. Mant. 295 (1771); Schreber, Beschreibung der Gräser, ii. 54. t. 29 (1772); Willd. Sp. Pl. iv. 395 (1805); not Rasp. Ann. Sci. Nat., Sér. I. v. 452 (1825); nor Hitchcock, Contrib. U. S. Nat. Herb. xii. Pt. 3: 124 (1908) and in Gray, Manual, ed. 7: 120 (1908). *Hydropyrum esculentum* Link, Hort. Berol. i. 252 (1827) in part; Kunth, Enum. i. 9 (1833) in part, not Suppl. 7, t. 1 (1835). *Melinum palustre* Link, Handb. i. 96 (1829). *Z. aquatica* Hitchcock, Contrib. U. S. Nat. Herb. xii. Pt. 3: 124 (1908) and in Gray, Manual, ed. 7: 120 (1908); not L. Sp. Pl. 991 (1753).—Eastern New Brunswick to central New York and eastern Ontario; northern Indiana. Type from Belgrade, Maine, Aug., 1895, *F. L. Scribner*.

The following specimens are typical: NEW BRUNSWICK: Lakeside, Aug. 25, 1923, *Svenson & Fassett*, no. 855; Westfield, Aug. 6, 1909, *M. L. Fernald*, no. 1285. MAINE: Calais, Aug. 3, 1909, *M. L. Fernald*, no. 1284; Milford, Aug. 15, 1916, *Fernald & Long*, no. 12579; Manchester, Aug., 1915, *F. L. Scribner*. VERMONT: Burlington, Aug. 5, 1921, *C. H. Knowlton*; Hubbardton, July 31, 1915, *Eames & Godfrey*, no. 9070. MASSACHUSETTS: Pepperell, Aug. 14, 1909, *L. W. Riddle* (in Herb. Wellesley College). NEW YORK: Plattsburg, Am.

in. n.-B. var. *angustifolia* & var. *intervar.* both occurred -  
and intermediates - seemed to be ecologic states with a few leaf  
sheaves. T. A. Ph. 52: 34, 1950.

made *Z. interior* (Fors.) Rydb. *Brittonia* 1:  
82. 1931. - not convincing

Gr. Nat. Herb. no. 435; DeKalb, Aug. 8, 1914, *O. P. Phelps*, no. 172; Selkirk, Oswego Co., Aug. 24, 1922, *Fernald, Wiegand, & Eames*, no. 14160. PROVINCE OF QUEBEC: Ste. Angele de Lavel, Nicolet Co., July 31, 1923, *Chamberlain & Knowlton*. ONTARIO: Russell, July 22, 1911, *John Macoun*, no. 85843; Ottawa, Sept. 16, 1912, *F. Fyles*; Ottawa, Aug. 8, 1894, *John Macoun*, no. 7506. INDIANA: Miller, Aug. 20, 1913, *H. H. Smith*, no. 5772.

1c. *Z. AQUATICA*, var. *interior*, n. var., culmis 0.9-3 m. altis; foliis 2-8 dm. longis 1-3 cm. latis, ligulis 1-1.5 cm. longis; ramis femineis luxuriosissimis cum 11-29 spiculis, ramis masculis luxuriosissimis cum (20-)30-60 spiculis (hic *Z. aquatica* simulantibus); lemmatibus femineis firmis nitentibus glabratris praeter margines nervosque et aristas (hic var. *angustifoliam* simulantibus).

Culms 0.9-3 m. tall: leaves 2-8 dm. long, 1-3 cm. broad; ligules 1-1.5 cm. long: lower pistillate branches with 11-29 spikelets; middle or lower staminate branches with (20-)30-60 spikelets (in these characters simulating typical *Z. aquatica*): pistillate lemmas firm, shining, glabrous except on the margins, nerves, and awns (in this character simulating var. *angustifolia*).<sup>1</sup>—*Z. aquatica* Lapham, Trans. Wisc. State Agri. Soc. iii. 419, pl. ii. (1854).—Lake Michigan to North Dakota and Nebraska; Texas. INDIANA: Wolf Lake, Aug. 8, 1920, *D. C. Peattie*. ILLINOIS: Bluff Lake, Union Co., Aug. 17, 1881, *A. B. Seymour* (in Herb. Wellesley College). MINNESOTA: Lake City, Aug. 20, 1883, *W. H. Manning*. WISCONSIN: Brown Co., June, 1885, *J. H. Schuette*. IOWA: Ogden, Aug. 20, 1898, *L. H. Pammel*, no. 2147; Armstrong, Aug. 27, 1897, *Pammel & Cratty*, no. 764 (TYPE in Gray Herb.). NEBRASKA: Whitman, July 31, 1893, *P. A. Rydberg*, no. 1630; Kennedy, Aug. 27, 1910, *J. M. Bates*. TEXAS: (no locality given) 1886-9, *G. C. Nealley*.

2. *Z. LATIFOLIA* Turcz. Bull. Soc. Nat. Mosc. 1838, no. 1: 105 (1838), and Cat. Baical.-Dahur. 21 (1838); Stapf, Kew Bull. 1909; 385 (1909). *Hydropyrum latifolium* Griseb. in Ledeb. Fl. Ros. iv. 466 (1853); Turcz. Bull. Soc. Nat. Mosc. xxix. Pt. 1: 2 (1856) and Fl. Baical.-Dahur. ii. Pt. 1: 289 (1856); Maxim. Primitiae Fl. Amur. 327 (1859); Regel, Tent. Fl. Ussuriensis, 171 (1861); Miq. Prol. Fl. Jap. 160 (1867); Franch. & Sav. Enum. Pl. Jap. ii. 156 (1879). *Z. dahurica* Turcz. ex Steud. Syn. Pl. Gram. 4 (1854). *Z. palustris* Siebold, Syn. Pl. Econ. 10 (1830). *Limnochloa cauduciflora* Turcz. in Trin. Mém. de l'Acad. de St. Pétersb. Sér. VI. v. Bot. 185 (1840), Reprint 19 (1839). *Z. aquatica* Benth. Journ. Linn. Soc. xix. 54 (1881) in part; Henry, Trans. Asiat. Soc. Jap. xxiv. Suppl. 107 (1896); Hackel, Bull. Herb. Boiss. ser. 1, vii. 646 (1899) and ser. 2, iii. 502

<sup>1</sup>See Brown & Scofield, Bull. no. 50 of the Bur. Pl. Ind. (1903). Plate V of this bulletin shows this plant and typical *Z. aquatica*. The difference in spread of the panicle of the two phases, here stressed, is not constant in the collection at the Gray Herbarium, but in this plate the spikelets of the plant in Fig. 2 may be seen to be decidedly thicker than that of Fig. 1. Plate IV, Fig. 1, and Plate VII, C, show the spikelets of var. *interior*.

(1903); Rendle, Journ. Linn. Soc. xxxvi. 345 (1904) in part; Matsu-mura, Index Pl. Jap. ii. 87 (1905); Nakai, Fl. Kor. ii. 352 (1911); not L. *Z. aquatica*, var. *latifolia* Komarov, Fl. Manshur. i. 261 (1901).—Eastern Siberia, China and Japan. There is a full discussion of this species by Stapf, l. c. *Z. latifolia* as published by Turczaninow was a *nomen nudum*, but Stapf took up this name in 1909, thus validating it.

#### EXCLUDED NAMES AND SPECIES.

*Z. aquatica* Willd. Sp. Pl. iv. 394 (1803) = *PHRAGMITES COMMUNIS* (L.) Trin. The author excludes the Gronovian plant, and gives the only habitat as Jamaica.

*Z. aquatica* Link, En. Pl. ii. 391 (1822) = *PHRAGMITES COMMUNIS* (L.) Trin.

*Zizania ? aristata* Kunth, Rev. Gram. i. 8 (1829) = *HYGRORYZA ARISTATA* Nees.

*Z. bonariensis* Balansa & Poitrass, Bull. Soc. Hist. Nat. Toul. xii. 228 (1878) = *ZIZANIOPSIS BONARIENSIS* Speg.

*Z. ciliata* Spreng. Syst. Veget. ii. 136 (1825) = *LEERSIA HEXANDRA* Sw.

*Z. fluitans* Michx. Fl. Bor.-Am. i. 75 (1803) = *HYDROCHLOA FLUITANS* Nash.

*Z. lenticularis* Michx. ex Steud. Nom. 898 (1821) is a *nomen nudum*, published without description or reference.

*Z. microstachya* Nees, ex Trin. in Mém. Acad. Pétersb. Sér. VI. v. Sc. Nat. ii. 183 (1839), Reprint 17. = *ZIZANIOPSIS MICROSTACHYA* Doell.

*Z. miliacea* Michx. Fl. Bor.-Am. i. 74 (1803) = *ZIZANIOPSIS MILIACEA* Doell. & Aschers.

*Z. natans* Bosc ex Trin. in Mém. Acad. Pétersb. Sér. VI. v. Sci. Nat. ii. 186 (1839), Reprint, 20. = *HYDROCHLOA CAROLINENSIS* Beauv.

*Z. nutans* Steud. Nom. ed. II. ii. 799 (1841) = *HYDROCHLOA CAROLINENSIS* Beauv.

*Z. palustris* Rasp. Ann. Sci. Nat., Sér. I. v. 452 (1825) = *COLEANTHUS SUBTILIS* Roem. & Schult.

*Z. Retzii* Spreng. Syst. Veget. ii. 136 (1825) = *HYGRORYZA ARISTATA* Nees.

*Z. subtilis* Rasp. l. c. 458 = *COLEANTHUS SUBTILIS* Roem. & Schult.

*Z. terrestris* L. Sp. Pl. 991 (1753) = *SCLERIA TERRESTRIS* (L.) n. comb. *Zizania terrestris* L. Sp. Pl. 991 (1753); Willd. Sp. Pl. iv. 396 (1805). *Scleria elata* Thwaites, Enum. Pl. Zeylandie, 353 (1864); Böck. Linnaea, xxxviii. 487 (1874); Clarke in Hooker, Fl. Brit. Ind. vi. 690 (1894); Trimen, Fl. Ceylon, v. 97 (1900); Ridley, materials for a Flora of the Malayan Peninsula, iii. 114 (1907).

Linnaeus based *Zizania terrestris* on the *Katou-Tfjolam* of the Hortus Malabarensis, which has a good plate illustrating clearly the

plant known as *Scleria elata*, so this combination becomes necessary under the International Rules. There are apparently two well-marked varieties of this species. *S. TERRESTRIS*, var. **latrix** (Clarke) n. comb. *S. elata*, var. *latrix* Clarke in Hooker, Fl. Br. Ind. vi. 690 (1894). *S. TERRESTRIS*, var. **decolorans** (Clarke) n. comb. *S. elata*, var. *decolorans* Clarke l. c.

GRADUATE SCHOOL OF ARTS AND SCIENCES, *Harvard University*.

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## FURTHER NOTES ON BRITISH COLUMBIA ALGAE.

WM. RANDOLPH TAYLOR.

IN 1921 the writer made a camping trip through portions of the mountains of British Columbia with Dr. M. H. Jacobs, collecting algae and bryophytes as much as possible.<sup>1</sup> During the past season under the same leader he was able to visit other portions of this territory and to secure further collections. The party entered the Selkirk Mountains from Golden, B. C., in late August and traversed successively parts of Cañon Creek, the Spillamacheen River, Grizzly Creek and the Beaver River, passing between the first three by passes in which branches of these streams had their sources. Camps were made at various points on the North Fork of Cañon Creek giving opportunity to visit several snow fields and small glaciers feeding this stream, and to visit that fork of Grizzly Creek which headed up with the North Fork. This is an entirely different Cañon Creek from that visited in 1921 near Revelstoke. From a camp on the Spillamacheen a visit was paid to Prairie Mountain, which lies between the upper part of that stream and the Beaver River. This is a long grassy ridge, comparatively low, (6-7000 feet) with a few streams and springs which proved particularly rich. The party finally left this portion of the country at Connaught on the Canadian Pacific Railroad. A short trip was also made up the Yoho Valley at Field and another in the neighborhood of Lake Louise in Alberta, but little collecting was done on these trips. Material was secured under much the same difficulties as on the previous trip and cared for in the same way.

Instead of the rigorous weather conditions of 1921 the party in 1923 was favored with clear skies and a warm sun, so that the pools in the

<sup>1</sup>Taylor, W. R. Notes on some algae from British Columbia. *RHODORA* 24: 101-111. 1922.

higher country only became slightly ice-coated at night. As a result the algae were in a more vigorous state, and many forms could be identified which were missed on the previous trip. Almost all the collecting was done in the open parkland and the alpine zones, that is from 5500 feet to permanent ice and snow. From lack of a barometer on this trip it is impossible to give very close approximations of the altitudes at which the different species were found. The small lakes which were at times found near the glaciers and snow patches and above the general grassland proved uniformly barren of algae which could be detected without a plankton net. The pools and rivulets in the meadowland were, however, very rich indeed, and as was found previously, very distinct in their individual floras. This individuality probably largely explains the considerable differences between the forms secured on the two trips.

The small alpine bog pools generally had a scum of partly decayed *Mougeotia*, *Zygnema*, filamentous blue-greens and unicells, while the banks and bottoms were often coated with *Scytonema*, *Schizothrix* and *Nostoc*. In the flats below the glaciers a considerable growth of filamentous greens (mostly sterile *Zygnema* and *Mougeotia*) covered the glacial silt among the rocks. Lower where the water fell more rapidly the rocks were often coated with such algae as *Dichothrix* and *Amphithrix*. The former was especially notable in the Yoho Valley where in one stream in particular the rocks were entirely covered with the calcareous crust and nodules of *D. gypsophila*. A little lower in the parkland area and down the streams well into the forest *Hydrurus* covered the stones in great masses. The heavy growth of *Cladophora* which is so familiar in the eastern states appeared to be absent.

As the study of the collections of material made in 1923 was finished there came to hand a study by K. M. Ström of the alpine algae of the Sarek Mountains.<sup>1</sup> Based on quite extensive collections it affords interesting material for comparison with the flora in British Columbia. Plankton-net gatherings made a valuable addition to the list, which also includes some 219 desmids. Excluding desmids and peridineae he reports about 100 species, about as many as the writer has secured in British Columbia. The floras of the two districts seem to be of approximately equal richness. Undoubtedly a study in the field of living material would add greatly to these lists. Many of the forms which were abundant in British Columbia were important

<sup>1</sup> Ström, K. M. The algae-flora of the Sarek Mountains. *Naturwissenschaft. Untersuch. Sarekgebirges Schwedisch-Lappland* 3: 437-521. 1923.

elements in the Sarek Mountains, as *Chroococcus turgidus*, *Merismopedia glauca*, *Nostoc commune*, *Synechococcus aeruginosus*, *Tolyphothrix lanata* and *Hydrurus foetidus*. In some cases it seems that somewhat different species fill corresponding places: *Gloeocapsa magna* in British Columbia seems to replace *G. sanguinea* in the Sarek Mountains, *Scytonema myochroum* in large part replaces *S. mirabile* and *Batrachospermum moniliforme*, *B. vagum keratophyllum*. On the other hand some of the algal curiosities are common to both districts: *Prasiola fluvialis*, *Pediastrum tricornutum alpinum*.

The following are the species found in 1923:

#### MYXOPHYCEAE

*AMPHITHRIX JANTHINA* (Mont.) B. & F. Forming a dark reddish coating on rocks in Cañon Creek in the forest and in alpine rivulets near the source of Grizzly Creek. Locally abundant.

*ANABAENA AFFINIS HOLSATICA* Lemm.? Rivulet near summit of Prairie Mountain. Scarce

*ANABAENA FLOS-AQUAE* (Lyngb.) Bréb. In parkland pools of the Cañon Creek valley and in a rivulet near the summit of Prairie Mountain. Scarce.

*ANABAENA INEQUALIS* (Ktz.) B. & F. In pools and among wet moss by streams, Cañon Creek and on Prairie Mountain. Frequent.

*ANABAENA OSCILLARIOIDES* Bory. In pools and streams, Prairie Mountain. Scarce.

*APHANOCAPSA GREVILLEI* (Hass.) Rich. Pools, parkland of Cañon Creek.

*APHANOTHECE PALLIDA* (Ktz.) Rabenh. Generally distributed; Cañon and Spillamacheen watersheds.

*APHANOTHECE SAXICOLA* Naeg. Pools, parkland; Prairie Mountain Cañon Creek and Spillamacheen valleys. Scarce.

*CALOTHRIX PARIETINA* (Naeg.) Thuret. Generally distributed; Cañon, Grizzly and Spillamacheen watersheds.

*CHAMAEISIPHON FUSCUM* (Rost.) Hansg. With *Amphithrix* on rocks in rivulet near head of Grizzly Creek.

*CHROOCOCCUS MACROCOCCUS* (Ktz.) Rabenh. Parkland pools, Cañon Creek, scarce.

*CHROOCOCCUS MINUTUS* (Ktz.) Naeg. Generally distributed, Cañon and Spillamacheen watersheds.

*CHROOCOCCUS TURGIDUS* (Ktz.) Naeg. Generally distributed,

Cañon and Spillamacheen watersheds. On a flooded rock by Cañon Creek in great abundance and the major element in the association.

*COELOSPHAERIUM NAEGELIANUM* Unger. Pools, parkland, Cañon Creek, scarce.

*COELOSPHAERIUM KUTZINGIANUM* Naeg. In a spring on Prairie Mountain, scarce.

*DICHTHOTHRIX GYPSOPHILA* (Ktz.) B. & F. In a stream on the flank of Prairie Mountain, scarce; abundant in streams near Twin Falls and the Yoho River, Field.

*DICHTHOTHRIX ORSINIANA* (Ktz.) B. & F. Abundant in rivulets on the east flank of Prairie Mountain.

*GLOEOCAPSA ALPINA* (Naeg.) Brand. Rivulet, east side of Prairie Mountain, scarce. Among Trentepchlia and other algae, Yoho Valley, abundant.

*GLOEOCAPSA MONTANA* Ktz. Frequent and widely distributed. Cañon and Spillamacheen watersheds.

*GLOEOTHECE FUSCO-LUTEA* Naeg. In parkland pools, Cañon Creek and Prairie Mountain.

*HAPALOSIPHON DELICATULUS* W. & G. S. West. Among muck in pool, Parkland, Cañon Creek, scarce.

*HYPHEOTHRIX CALCICOLA* (Ag.) Rabenh.? On rocks and in pools, Cañon Creek and Prairie Mountain.

*MERISMOPEDIA GLAUCA* (Ehrb.) Naeg. Pools, parkland, Cañon Creek and Prairie Mountain, frequent in some spots.

*MERISMOPEDIA PUNCTATA* Meyen. Pools, parkland, Cañon Creek and Prairie Mountain, scarce.

*NODULARIA HARVEYANA* (Thw.) Thuret? Among moss in a pool, parkland, Cañon Creek.

*NOSTOC CAERULEUM* Lyngb. Among muck in parkland pool, Cañon Creek, scarce.

*NOSTOC COMMUNE* Vauch. Frequent and generally distributed. In Duchesnay Lake, near Field, in large masses.

*NOSTOC MACROSPORUM* Menegh. In red surface mud from a dried pool, parkland, Cañon Creek.

*NOSTOC MICROSCOPICUM* Carm. Frequent and widely distributed. Occasionally the major item in parkland pool muck.

*NOSTOC PUNCTIFORME* (Ktz.) Hariot. In muck from banks of pools, Cañon Creek and Prairie Mountain, scarce.

*OSCILLATORIA AMOENA* (Ktz.) Gom. Forming a blue-green coating

on muck or stones in rivulets or among moss, lower Cañon Creek valley.

*OSCILLATORIA CHALYBEA* Mertens. Wet rocks and among mosses, parkland of Cañon Creek and Prairie Mountain.

*OSCILLATORIA FORMOSA* Bory. Wet rocks and among mosses, parkland of Cañon Creek and Prairie Mountains.

*OSCILLATORIA PRINCEPS* Vauch. In a parkland pool among mosses, Cañon Creek.

*OSCILLATORIA SPLENDIDA* Grev. In a parkland pool among mosses, Cañon Creek.

*SCHIZOTHRIX* Sp.? Abundant in red surface mud from a dried pool, parkland, Cañon Creek.

*SCYTONEEMA MYOCHROUS* (Dillw.) Ktz. The major item among moss and over bottom mud of several parkland pools in Cañon Creek valley and on Prairie Mountain. Occasional in many collections.

*STIGONEMA INFORME* Ktz. From the bank of a rivulet on the east side of Prairie Mountain.

*STIGONEMA OCELLATUM* (Dillw.) Thuret. Abundant in a few pools, parkland of Cañon Creek and the Spillamacheen.

*SYNECHOCOCCUS AERUGINOSUS* Naeg. Occasional in muck in parkland pools, widely distributed.

*TOLYPOTHRIX LANATA* (Desv.) Wartm. Occasional in muck in parkland pools, in two cases in Cañon Creek valley the major item.

*TOLYPOTHRIX PENICILLATA* (Ag.) Thuret. On stones in side pools of rivulets, Cañon Creek valley and on Prairie Mountain; the major element where found.

#### CHLOROPHYCEAE

*ANKISTRODESMUS FALCATUS* (Corda) Ralfs. Pools, parkland of Cañon Creek and Prairie Mountain, scarce.

*ASTEROCOCCUS SUPERBUS* (Cienk.) Scherffel. Pools on Prairie Mountain and in the Spillamacheen Valley, scarce.

*CHAETOPHORA ELEGANS* (Roth) Ag. Abundant in a watering trough by the road from Golden to Windermere.

*CHAETOSPHAERIDIUM GLOBOSUM* (Nordst.) Kleb. On algae in pool, parkland, Cañon Creek. Scarce.

*CHLAMYDOMONAS NIVALIS* (Baur) Wille.? Forming Red Snow below a little glacier on the west side of Cañon Creek valley. Red Snow was also seen near the head of a branch of the Spillamacheen.

*COELASTRUM PROBOSCIDEUM* Bohlin. Frequent in a spring on the east side of Prairie Mountain near the rocky summit.

*COLEOCHAETE ORBICULARIS* Pringsh. Rare in a pool in parkland, Cañon Creek.

*DIMORPHOCOCCUS CORDATUS* Wolle. Rare, with *Coelastrum*.

*HERPOSTEIRON VERMICULOIDES* (Wolle) Collins. On other algae, parkland pools, Cañon Creek, scarce

*HORMOTILA MUCIGENA* Borzi. Among other algae in a parkland pool, Cañon Creek, rare.

*OEDOGONIUM LONGATUM* Ktz.? Fruiting among mosses in a pool in parkland, Cañon Creek

*OOCYSTIS SOLITARIA* Wille. On mud, rivulet on Prairie Mountain, rare.

*OOCYSTIS SOLITARIA MAJOR* Wille. In parkland pools, Cañon Creek valley and Prairie Mountain. Scarce.

*PEDIASTRUM BORYANUM* (Turp.) Menegh. In a spring on Prairie Mountain.

*PEDIASTRUM BORYANUM LONGICORNE* Racib. In pools on Cañon Creek and Prairie Mountain.

*PEDIASTRUM TRICORNUTUM ALPINUM* Schmidle. In a spring and pools on Prairie Mountain.

*SCENEDESMUS ABUNDANS* (Kirch.) Chodat. In a spring on Prairie Mountain.

*SCENEDESMUS ARCUATUS* Lemm. With the above.

*SCENEDESMUS BIJUGA* (Turp.) Lagerh. With the above.

*SCENEDESMUS QUADRICAUDA* (Turp.) Bréb. With the above.

*SCHIZOCHLAMYS DELICATULA* W. West Floating in a pool in parkland, Cañon Creek, the major item. Among mosses in another spot.

*TRENTEPOHLIA AUREA* (L.) Mart. On rocks near foot of Twin Falls, Yoho Valley near Field. Not noted as abundantly as on trip of 1921. It was omitted from the list in the report of that trip through an oversight.

*VAUCHERIA LONGIPES* Collins. On a shale bank beside Cañon Creek in parkland, abundantly fruiting.

#### HETEROKONTAE

*OPHIOCYTUM PARVULUM* (Perty) A. Br. In pools Cañon Creek valley and on Prairie Mountain.

TRIBONEMA BOMBYCINA TENUIS Hazen. Occasional in pools in the Cañon Creek valley and on Prairie Mountain.

#### FLAGELLATAE

HYDRURUS FOETIDUS (Villm.) Kirchn. Occasionally covering rocks in rivulets entering Cañon Creek and Grizzly Creek to the exclusion of other vegetation.

#### RHODOPHYCEAE

LEMANEA FUCINA Bory. A rock in a large tributary which entered the Spillamacheen from the east across Prairie Mountain from Glacier Circle was covered below the water level with a fine fruiting growth of this *Lemanea*.

UNIVERSITY OF PENNSYLVANIA.

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### REPORTS ON THE FLORA OF THE BOSTON DISTRICT,—XLIX.

#### COMPOSITAE.

##### SONCHUS.

S. ARVENSIS L. Waste places; frequent, especially near the sea.

S. ARVENSIS L., var. GLABRESCENS Wimm. & Grab. One plant in garden for one year, Hingham (*C. H. Knowlton*, Aug. 18, 1918). Specimen in herb. C. H. Knowlton. Adventive from Europe.

S. ASPER (L.) Hill. Rich moist soil in waste places, frequent.

S. OLERACEUS L. Waste ground, rather common.

S. OLERACEUS L., forma LACERUS (Willd.) G. Beck. Dumping ground near Mt. Auburn, Cambridge (*B. L. Robinson*, Aug. 22, 1897). Specimens in herb. Gray and N. E. Botanical Club. A European waif.

##### TANACETUM.

T. VULGARE L. Waste places, common; especially abundant in Boston.

T. VULGARE L., var. CRISPUM DC. Persistent around old places, and spreading to waste ground, rare.

##### TARAXACUM.

See Earl Edward Sherff, *Bot. Gaz.* lxx. 329–359, 1920.

**T. VULGARE** (Lam.) Schrank. (Includes *T. officinale* Weber and var. *palustre* (Sm.) Blytt of Gray's Manual, 7th Ed.) Fields, lawns and roadsides, very common throughout.

**T. LAEVIGATUM** (Willd.) DC. (*T. erythrospermum* Andrz. of Gray's Manual, 7th Ed.) Ledges and dry soil, frequent.

#### TRAGOPOGON.

**T. PORRIFOLIUS** L. Casual at Wellesley Hills (*F. W. Hunnewell*).

**T. PRATENSIS** L. Fields and waste places, rare.

#### TUSSILAGO.

**T. FARFARA** L. Wet places, usually in clayey soil, rare (11 stations from Amesbury to Scituate).

#### VERBESINA.

**V. ENCELIOIDES** (Cav.) B. & H., var. *EXAURICULATA* Robinson & Greenman. From wool washings, Parker River Mills, Georgetown (*Mrs. C. N. S. Horner*, no date). Specimen in herb. N. E. Botanical Club.

#### VERNONIA.

**V. FASCICULATA** Michx. Medford (*L. L. Dame*, August, 1886; *Mrs. P. D. Richards*, Oct. 10, 1887). Specimens in herb. Gray and N. E. Botanical Club.

**V. noveboracensis** Willd. Swamps and wet places; frequent from Medford, Weston, Newton and Concord south.

#### XANTHIUM.

See Millspaugh & Sherff, Field Mus. Publ. Bot. iv. 9-49, pl. 7-13, 1919.

**X. AMBROSIOIDES** Hook. & Arn. S. Boston (*C. E. Perkins*, July, 1878). Specimen in herb. N. E. Botanical Club. Native of South America.

**X. chinense** Mill. (*X. canadense* of Gray's Manual, 7th Ed., *not* Mill.) Sandy and gravelly shores; Lawrence, Boston, Wayland.

**X. echinatum** Murr. Sandy shores and waste places from Newburyport to Duxbury, mostly near salt water.

**X. italicum** Moretti. (*X. commune* Britton.) Sandy shores and waste places. occasional.

**X. PENNSYLVANICUM** Wallr. Waste places; Lawrence (*A. S. Pease*,

Sept. 18, 1901); Back Bay, Boston (*T. O. Fuller*, Sept. 25, 1885); St. Botolph St., Boston (*E. F. Williams*, Sept. 13, 1895). Introduced from middle states.

*X. SPINOSUM* L. Waste places, especially near mills, rare (12 stations).

*X. STRUMARIUM* L. Woolwaste, N. Chelmsford (*W. P. Alcott*, according to Dame & Collins, Fl. Middlesex Co. 51, 1888); Crescent Beach, Revere (*M. L. Fernald*, Oct. 20, 1912).

*X. WOOTONI* Cockerell. Made land, S. Boston flats (*W. Deane*, Oct. 4, 1909; *W. S. Ripley, Jr.*, Oct. 8, 1915). Adventive from southwestern United States.

C. H. KNOWLTON      }      Committee on  
WALTER DEANE      }      Local Flora.

*SAXIFRAGA AIZOON* ON Mt. KTAADN.—On August 17, 1923, eight members of the Appalachian Mountain Club made the ascent of the Chimney on Mt. Ktaadn, Maine. On starting up a steep bank to avoid climbing in the brook, the writer came upon several colonies of *Saxifraga Aizoon* Jacq. The plants looked like some sort of cactus and quite out of place in that cold ravine. Although they seemed thrifty, there was no sign of any flowers, old or young. The larger plants had sent out new ones on runners so that when I attempted to gather a specimen, many others came up with it. This Saxifrage is a plant commonly of calcareous regions, but Ktaadn is granitic. The specimens collected, which are the first from Maine, are in the Gray Herbarium.

There was colony after colony of *Saxifraga stellaris* L. var. *comosa* Willd. all the way to the top of the Chimney. We found it also near the top of the west wall of the Great Basin.—RACHEL L. LOWE, Portland, Maine.

*Vol. 26, no. 306, including pages 113 to 132 and plate 144, was issued 5 July, 1924.*

*The date of the July issue (unpublished as this goes to press) will be announced later*



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